Assignment 3 – Part 7

Each of the four programs provided some level of compression, compared to the original file. I was unable to get compress2.exe to work for frosty.jpg and Lego-big.gif.temp, and gone\_fishing.bmp.Z is already a .Z file, so it did not further compression for that file. Overall, compress2.exe and LZWmod with or without the codebook reset performed almost equally. There were a few minor edge cases where compress2 had a better compression performance, as illustrated by the greater compression ratio, but compress2’s superior quality was in its run time. In the table below, runtime for compression was considered to be relatively instant, unless otherwise noted in the column for the compression method.

A screen shot of a computer

Description automatically generated

For some of the larger files, LZWmod (both with and without the reset) took a few moments to process, usually a matter of a few seconds. LZW, however, got hung up pretty severely on a couple of the larger files, most notably all.tar where LZW took a matter of a few minutes to compress. This is likely because the tar file had a significant size, and LZW did not have the benefit of variable length codewords seen in LZWmod. LZW also used a less than optimized TST where the keys used were String objects, vice StringBuilder objects, so the substring() method generates additional overhead that can’t be avoided. Ultimately, the LZW compression is the inferior compression algorithm.

LZWmod with and without the reset performed well, where in most cases the reset and nonreset parameters performed about equally. The nonreset version of LZWmod tended to perform better when it came to large files and image files. This is most likely due to the structure of those files themselves where patterns of bits being repeated is probable, especially with the .jpg files.

Overall, the compress2.exe had the superior performance. It gave equal or sometimes better compression ratios, and its runtime was instantaneous for each file given to it. I’m sure that it can be utilized for the .jpg and .temp files, and once it is, I expect it to outperform the LZWmod compression. Since compress2 is already an implementation of LZW compression, its performance is not necessarily shocking in this case.